



TECHNICAL INFORMATION

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ABSTRACT

Essentia Water delivers the unique capacity to quench “free radicals” and exhibits the physical characteristic of smaller water clusters (i.e., water with greater saturation). **Essentia Water** is an ultra-pure, non-source dependent water with bioavailable essential electrolytes, and high pH (alkalinity).

The purpose of this Technical Information is to characterize **Essentia Water's** unique features in contrast to other bottled waters and to explain the potential effects of these characteristics upon human physiology.

METHODS

Essentia Water and other bottled waters were analyzed by Aquatic Consulting & Testing Laboratory¹, Phoenix, AZ for: 1) oxidation-reduction potential (ORP), 2) specific conductivity, and 3) pH, in accordance with Standard Method 2580, Standard Method 2510B, and EPA Method 150.1, respectively.

Nuclear Magnetic Resonance (NMR) spectrometry of **Essentia Water**, tap, well and distilled waters was conducted by Acorn NMR Laboratory, Fremont, CA using the Oxygen Isotope 17 method.

RESULTS

Laboratory analyses indicate that **Essentia Water** has the unique combination of low oxidation-reduction potential, physiological level of conductivity, and high alkalinity. The other bottled waters demonstrated comparable results only in a singular parameter (i.e., pH or conductivity).

NMR spectrometry demonstrated that **Essentia Water** has a lower vibrational frequency of 60-Hertz (Hz); and therefore, smaller water cluster size and is subsequently “a more saturating” water in comparison to non-electrolyzed waters.

CONCLUSIONS

Essentia Water's state-of-the-art Ionic Separation technology produces the synergy of lower oxidation-reduction potential, smaller water clusters (lower surface tension), and high pH (alkalinity). Smaller water clusters enhance transport across cell membranes, promoting intracellular hydration, and removal of metabolites.

Essentia Water is an extremely pure, non-source dependent water that possesses unique physical and electrochemical properties enhanced with a proprietary bioavailable electrolyte formulation for cellular hydration and a physiological conductivity.

Essentia Water is “Clearly . . . more than water” and has established the dawn of “hydrocenticalsTM”.

INTRODUCTION

The distinctive physical and electrochemical properties of **Essentia Water** have been analyzed and the results presented in this Technical Information. Laboratory analyses indicated that compared to other bottled waters, **Essentia Water** has the following unique combination of physical and “electrochemical” properties:

- 1) **Increased antioxidant activity** (lower oxidation-reduction potential) by increased active hydrogen concentrations;
- 2) **Smaller water clusters** to assist in absorption of nutrients and removal of toxins across the cell membrane;
- 3) **Physiological level of conductivity** derived solely from a balanced electrolyte fortification of intracellular/extracellular body fluids; and
- 4) **High pH** (alkalinity) to continually neutralize ongoing acidic conditions produced by the human body.

Alkaline water with reducing capabilities is produced using electrolysis to electrically split water into alkaline and acid water streams. The resultant “functional water” technology was first developed in Japan in the early 1950's and approved for medical therapeutics by The Ministry of Health and Rehabilitation in Japan in January 1966².

Based upon the clinical improvement of humans with a variety of diseases after the intake of reduced water, Dr. Hidemitsu Hayashi, Director of the Water Institute of Japan, proposed the “Water Regulating Theory”. This theory suggests that the active hydrogen of reduced water “quenches” free radicals or reactive oxidative metabolites. The scavenging of free radicals by reduced, alkaline water is similar to the body's own natural enzyme antioxidant, superoxide dismutase (SOD)^{2,8}.

Essentia Water utilizes this technology to create the world's first bottled “functional water”.

MEASUREMENTS

Essentia Water, as well as other competitors' bottled waters were measured at Aquatic Consulting & Testing Laboratory (ACTL) in June 1999, for the following parameters:

- Oxidation-reduction potential (ORP)
- Conductivity
- pH

ACTL analyzed these waters in accordance with Standard Method 2580, Standard Method 2510B, and EPA Method 150.1, respectively. Nuclear Magnetic Resonance spectrometry of **Essentia Water**, tap, well, and de-ionized waters was conducted by Acorn NMR Laboratory, Fremont, CA using Oxygen Isotope 17 method.

The laboratories implemented industrial quality assurance and quality control (QA/QC) standards to obtain these values.

The ORP scale ranges from + 1200 millivolts (mV) to -800 mV and zero (0) mV is neutral. pH is measured on a scale of 0 to 14 (no units). Normal physiological serum fluid pH is slightly alkaline and ranges from 7.35 to 7.45.

THE IMPORTANCE OF WATER TO THE HUMAN BODY

The basic living unit of the body is the "cell". Each organ in the body is composed of many different types of cells. The entire body contains about 100 trillion cells all "bathed" inside and outside with water³. About 60% of the adult human body by weight is fluid. Most of this fluid is inside the cells and is called intracellular fluid (*See Definitions*). The remaining fluid is outside the cell and is called extracellular fluid (*See Definitions*).

The water molecule is a simple inorganic molecule, but plays a critical part in life's functions. The hydrogen and oxygen atoms of water are joined by polarized covalent bonds. The polarization of the molecule allows water molecules to enter hydrogen bonds with other water and polarized molecules. Hydrogen bonds are weak electrostatic bonds. They can form between polarized regions, wherever a relatively electronegative oxygen atom shares a polar bond with a hydrogen atom. Negatively charged oxygen forms a hydrogen bond with a hydrogen atom on another molecule, or another region of the same molecule. Hydrogen bonds form 'bridges' that stabilize large molecules (i.e., macromolecules), most notably nuclear and mitochondrial DNA. In water, hydrogen bonds between water molecules account for many of the distinctive characteristics of water⁴. Each water molecule can be involved in up to four hydrogen bonds. Hydrogen bonds between water molecules are responsible for water's physical property of cohesion. Cohesion directly affects surface tension which allows water droplets to 'bead up'⁵. **Essentia Water's** Ionic Separation process breaks a portion of these hydrogen bonds resulting in lower surface tension or cohesion. The lower surface tension enables **Essentia Water** to saturate the intracellular and extracellular fluid spaces more readily.

Water is also capable of interacting with polarized or charged regions of other molecules. Hydrogen bonds can form between water molecules and amino or hydroxyl groups on other molecules. Water is able to 'cling' to substances that have hydrogen-bonding regions such as amino acids, enzymes, ribonucleic acid (RNA), and deoxyribonucleic acid (DNA)⁶.

Some small molecules are also hydrophilic or 'water loving' and are able to become involved in hydrogen bonds. These small molecules dissolve in water and their attraction to water is stronger than their attraction to each other. Glucose is a good example. The many hydroxyl groups of the glucose molecule all serve as hydrogen bonding sites.

HISTORICAL DEVELOPMENT OF ALKALINIZED WATER

One group of humans documented as having longevity of life are the Hunza. These people are located in the Karakoram Mountains of northern Pakistan and are documented centenarians (living to 100 years of age and longer). For many years, anthropologists have pondered the mystery of what enables the Hunzas to live so long and what makes them so healthy. Some researchers believe that the Hunza's elixir for longevity maybe derived from the water they drink. The mountain water that flows through their villages comes from the surrounding glaciers. The physical and chemical characteristics of this particular glacial run-off water are found to be unique by researchers. Researchers found that the Hunza water has an extraordinary amount of active hydrogen (hydrogen atom with an extra electron) and high pH (alkalinity). These active hydrogen atoms are powerful free radical scavengers.

In 1953, Professor Kemeny, Co-Vice Chancellor of Biomathematics at the Polytechnic Institute in Budapest, Hungary correlated specific properties of water and the internal environment of the body by the following three parameters:

- 1) Oxidation-reduction potential (relative measurement of active hydrogen)
- 2) Conductivity, and
- 3) pH

In 1959, a young French hydrologist, Dr. Louis Claude Vincent demonstrated various physical and electrochemical characteristics of water that varied from region to region in France. A correlation was developed between areas of higher disease incidence and these specific properties of the waters⁵.

In an effort to recreate the Hunza water, Japanese scientists investigated Russian electrolysis technology. Alkaline water is produced using electrolysis to electrically split filtered influent water into alkaline and acid water streams. As stated, "functional water" technology was first developed in Japan in the early 1950's and approved for medical therapeutics in Japan by The Ministry of Health and Rehabilitation in January 1966².

Based upon the clinical improvement of humans with a variety of diseases after the intake of alkaline reduced water, Dr. Hidemitsu Hayashi, Director of the Water Institute of Japan, proposed the "**Water Regulating Theory**". This theory suggests that the active hydrogen of reduced water "quenches" free radicals or reactive oxidative metabolites.

CELLULAR ABSORPTION AND DETOXIFICATION

The water we drink differs substantially from the water that “baths” the tissue and cells in the body (i.e., extracellular fluids). The extracellular fluids have a surface tension of 45 dynes. It is necessary for the body to reduce the surface tension of water we consume in order for the nutrients to pass through the cell membrane so metabolites (i.e., waste products) can be excreted from the cell. Water molecule cluster size is a relative indication of surface tension. Smaller water clusters have relatively less cohesion as a result of a fewer number of hydrogen bonds between the individual water molecules. The surface tension is decreased because the water clusters are fractionated.⁷

Essentia Water has unique physical properties of “smaller water clusters” as measured by nuclear magnetic resonance (NMR). NMR analyses reveal that tap water and well water clusters consists of 10-13 water molecules. **Essentia Water** has reduced cluster sizes of 5-8 water molecules per cluster. As illustrated in *Figure 1*, the NMR signal which measured the cluster size of **Essentia Water** at 60 Hertz (Hz) in peak width, reveals that **Essentia Water** clusters are smaller than tap and well water. Tap, well, and deionized waters measured 69, 82, and 89/130 Hz, respectively (See *Figure 1*). Wider peak widths indicate non-electrolyzed waters have larger water clusters. Smaller clusters of **Essentia Water** reduce the surface tension of extracellular fluids and enhance the absorption and detoxification of the cells' interior and extracellular fluid volumes. **Essentia Water** is able to saturate the cell more rapidly.

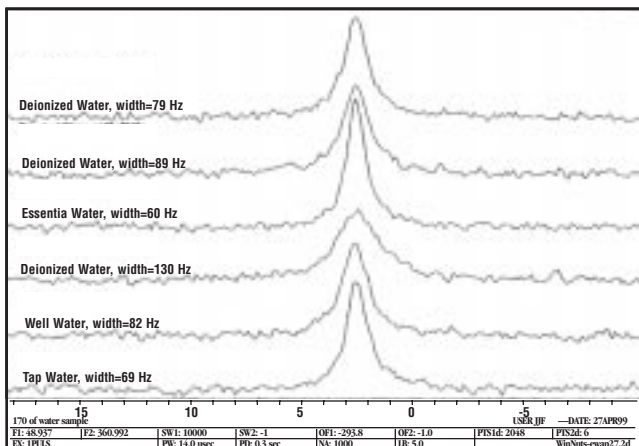


FIGURE 1. Nuclear Magnetic Resonance Spectrometry (¹⁷O isotope) of **Essentia Water** and non-electrolyzed waters.

ANTIOXIDANTS

Active oxygen species or free radicals are considered to cause extensive oxidative damage to biological macro-molecules, which brings about a variety of diseases and aging.

The ideal scavenger for free radicals is active hydrogen. Active hydrogen is produced in the reduced, alkaline water stream near the cathode during the ionic separation of water^{2,8}. Antioxidants are substances that inhibit the rate of oxidation caused by free radicals. Antioxidants can be classified in five major groups based upon where and how they work within the body. *The five major classes are natural preventive, scavenging, dietary, natural enzyme, and pharmacological antioxidants.*⁹

Natural preventive antioxidants include transferrin, lactoferrin, ceruloplasmin and albumin, which are found primarily in blood plasma. Examples of *scavenging antioxidants* are uric acid, bilirubin, sulfhydryl, vitamin C, vitamin E, beta-carotene, flavonoids, and melatonin. *Dietary antioxidants* are commonly found in tea, fruits, and vegetables. *Natural enzyme antioxidants* are found in the intracellular environment and include superoxide dismutase (SOD), catalase, and glutathione peroxidase. *Pharmacological* agents that may have direct or indirect antioxidant activity include: acetylcysteine, SOD, deferoxamine, Probuco, Amidarone, Captopril, and Rezulin¹⁰. All of the aforementioned drugs have well-documented toxicity and side effects. Their use requires direct medical supervision by a licensed medical doctor.

Based upon interesting clinical improvement of a variety of diseases through the intake of reduced water, Dr. Hidemitsu Hayashi, Director of the Water Institute of Japan, proposed the “**Water Regulating Theory**”. Since 1985, this theory suggests that the active hydrogen of reduced water “quenches” free radicals or reactive oxidative metabolites. Research demonstrates that reduced water scavenges active oxygen species and protects DNA from damage by oxygen radicals similar to the natural enzyme antioxidant, superoxide dismutase^{2,8}. **Essentia Water** also is a reduced, alkaline water with an abundant concentration of active hydrogen that “neutralizes or quenches free radicals”.

The smaller molecular weight of hydrogen compared to other antioxidants concentrates its reducing capability for a given amount of antioxidant. Each atom of an antioxidant donates one and only one electron to neutralize the chain of free radicals. So whether large or small, the end result of the antioxidant is to provide a singular electron. The molecular weight of water (i.e., 18 grams per mole) is one-tenth the molecular weight of Vitamin C (i.e., 176 grams per mole).

Oxidation-Reduction Potential (ORP) is a measurement of the potential for a reaction to occur. ORP represents electron concentration and activity level. An ORP in the positive range indicates oxidation, (i.e., the absence of chemical potential energy, and an inability to perform additional chemical reactions).

An ORP in the negative range indicates chemical reduction, (i.e., and the presence of electrons, potential energy, and the ability to generate additional chemical reactions). **Essentia Water**, compared to other bottled waters has the lowest ORP value or greater relative abundance of electrons (See *Figure 2*).

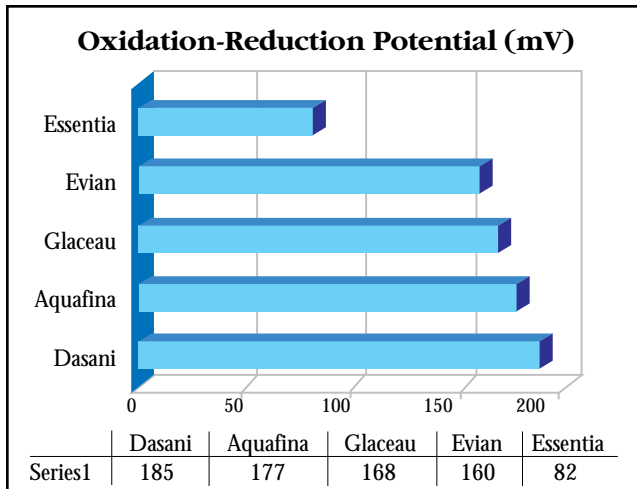


FIGURE 2. Oxidation-Reduction Potential (mV) of **Essentia Water** and other bottled water brands.

FREE RADICAL

Under normal physiological conditions, the use of oxygen by cells of aerobic organisms generates potentially deleterious reactive oxygen metabolites. A chronic state of oxidative stress exists in cells because of the imbalance between pro-oxidants and antioxidants. The amount of oxidative damage increases as humans age and is postulated to be a major causal factor of senescence. This hypothesis is supported by the observations that an over expression of antioxidative enzymes retards the age-related accrual of oxidative damage and extends the maximum life span of fruit flies. In addition, longevity of species is inversely proportional to the rates of mitochondria generation (i.e., “powerhouse of the cell”) of superoxide anion radicals and hydrogen peroxide¹¹.

There are several indications that the oxidant challenge to aerobic cells is not trivial. It is estimated that 2-3% of the oxygen consumed is diverted to the generation of superoxide anion radicals and hydrogen peroxide. A typical rat cell may undergo 100,000 reactive oxygen metabolites (ROM) on DNA per day. The presence of these ROM interactions has led to the concept that antioxidative defenses are not fully efficient, that cells are chronically under oxidative stress, and that aging is a consequence of oxidative stress¹¹.

INTRACELLULAR FLUID ELECTROLYTE REPLACEMENT

The human body's performance depends on maintaining proper hydration and electrolyte balance. Approximately 60% of an average adults body weight is water, about 75% of this water is found within the individual cells as intracellular fluid. This intracellular fluid provides the media for every complex chemical reaction that the body must carry out in order to maintain a natural and healthy status. An integral part of the intracellular fluid is the electrolytes contained within its matrix. Electrolytes are positively and negatively charged ions who function to:

- 1) Control distributions of water between body compartments;
- 2.) Carry electrical current allowing production of action potential in muscle and nerve activity;
- 3) Assist in transport of nutrient across cell membranes; and
- 4) Maintain optimum acids-base balance for metabolism¹².

The electrolytes found in the body work together with amazing precision. Slight alterations in the intracellular electrolyte balance may cause physical symptoms as simple as muscle cramps or as grave as cardiac arrhythmias. Regardless of the severity, rehydration must occur and vital electrolytes must be replaced. **Essentia Water** meets the majority of the body's requirements per liter for essential intracellular electrolytes (See Table 1).

Table 1. Physiological functions of essential electrolytes /L

Na	100%	Key regulator of water balance.
K	<10%	Associated with acid-base balance, promotes enzyme action for cellular metabolism.
Ca	100%	Integral role in clotting mechanism, and muscle physiology.
Mg	<10%	Transmission and conduction of nerve impulses, responsible for transportation of Ca and K across cell walls via sodium-potassium pump.
HCO ₃	100%	Carbonic acid/Bicarbonate buffer systems.
SO ₄	100%	Building block for sulfur amino acids.
PO ₄	100%	Phosphate buffer system.

Essentia Water has been specifically formulated to rapidly restore intracellular fluids to their optimum state by taking advantage of the process the body naturally uses, the phenomenon of osmosis. **Essentia Water** has been designed to simulate intracellular fluid electrolyte concentrations. Solutions that have identical osmotic pressures are said to be isotonic solutions. For optimal and rapid replenishment of intracellular fluids and electrolytes, the replenishing fluid must be isotonic with intracellular fluids (See Figure 3, on the next page).

For example, if cells are bathed in a hypertonic solution, which is solution having an osmotic pressure higher than that of intracellular fluids, the cell will shrivel because of a net transfer of water out of the cell, this phenomenon is called crenation. The opposite situation occurs when cells are bathed in a solution with an osmotic pressure lower than that of the intracellular fluids. In this case the cells rupture because of the net flow of water into the cell, a process known as lysis.

The extracellular fluid is in constant motion throughout the body. It is rapidly transported in the circulating blood, then mixed between blood and the tissue fluids by diffusion through capillary walls. The extracellular fluid contains “ions” (See Definitions) and nutrients required by cells for maintenance of cellular life. All cells thrive essentially in the same environment, the extracellular fluid. This is the reason it is called the internal environment of the body, or the *milieu interieur*, a term coined by the 19th century French physiologist, Claude Bernard³. As humans age, there is a definite predisposition to a shifting of body water composition from intracellular to extracellular. The ratio of intracellular to extracellular water content changes from approximately 1.1 to almost 0.8 between the ages of 20 and 70. The realization is that as we age, we become chronically dehydrated with a decreased ability to rehydrate. The body loses its reserve capacity of protein and enzyme function. This function is only optimally active with proper hydration.

The major determinants of intracellular and extracellular fluid volume homeostasis are separate. **Sodium balance regulates extracellular fluid volume while sufficient hydration regulates intracellular fluid volume**¹³. This suggests that the loss of intracellular water accompanying the aging process may be minimized or totally negated by an individual's conscious decision to maintain proper hydration before thirst is perceived. *Thirst*, the primary regulator of the intake of water, is defined as the *conscious desire for water*³.

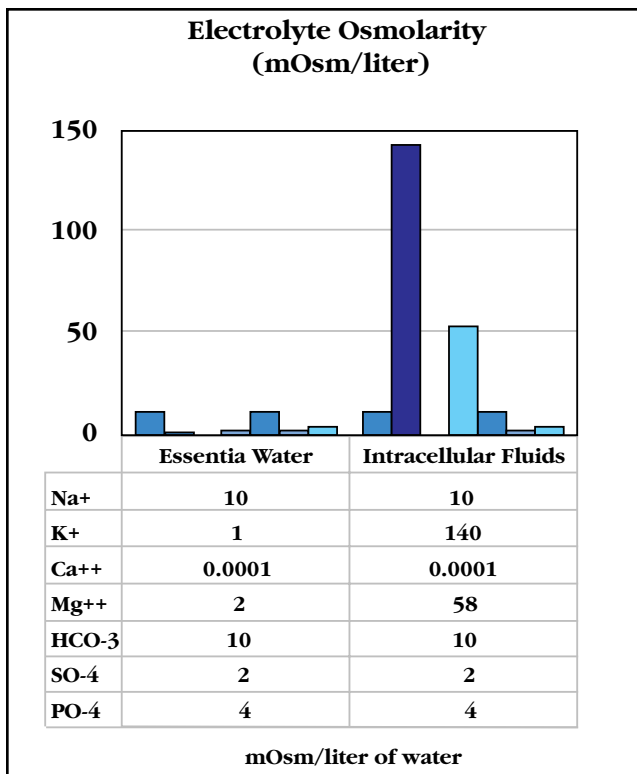


FIGURE 3. Osmolarity of **Essentia Water** and intracellular fluids¹⁴.

ELECTRICAL CONDUCTIVITY & ELECTROLYTES

Virtually, every action that takes place in the body requires communication of chemical messages from one cell to another, and is conducted by the passage of electrons through the extracellular fluids. An optimal level of conductivity in these fluids is essential to life and cellular activity. Conductivity is the ability of an electrical current to pass through a medium. The factor that dictates whether or not a solution is electrically conductive is dependent upon the relative concentration of ions. An established concentration of ions, (e.g., “electrolytes”), is essential to aid the body and allow it to carry out complex and diverse biochemical reactions. Sodium is lost through perspiration (aka, “sweat”). Losses of sufficient sweat to decrease body weight by 3% significantly diminish a person's performance. Rapid perspiration losses of 5 to 10% body weight are considered very serious and often result in muscle cramps, nausea, and dizziness. Potassium losses result partly from increased aldosterone during acclimatization to heat, which increases the loss of potassium in to urine as well as sweat³.

Essentia Water is formulated with a bioavailable proprietary formulation of electrolytes which simulate the concentration of electrolytes in the human cell. The conductivity of Essentia Water is a direct result of the electrolyte fortification (See Figure 4). Other bottled waters may have conductivity as a result of trace metals, mineral salts, and other arbitrary constituents.

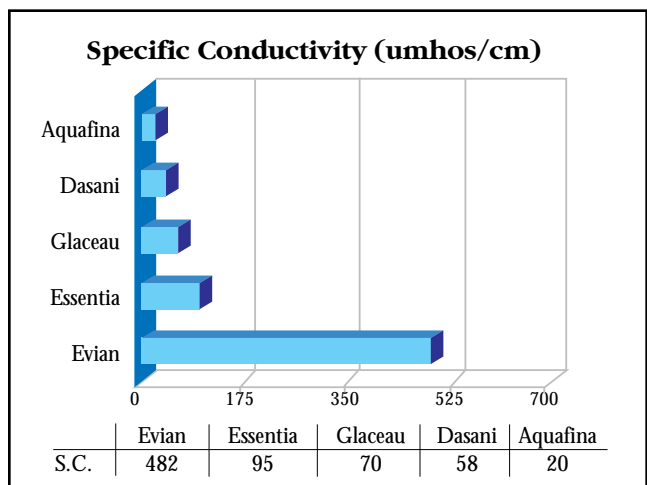


FIGURE 4. Specific conductivity of **Essentia Water** and other bottled water brands.

REGULATION OF ACID-BASE IN THE BODY

To prevent acidosis or alkalosis, all body fluids are supplied with acid-base buffer systems that immediately combine with any acid or base to prevent excessive changes in the hydrogen ion concentration (i.e., pH) of the body. If the hydrogen ion concentration changes significantly the respiratory center is immediately activated to alter the rate of breathing. As a result, the carbon dioxide removal from

body fluids is automatically changed. Additionally, kidneys excrete either acid or alkaline urine to adjust the hydrogen ion concentration of the body fluids back to normal. For rapid changes in hydrogen ion concentrations the respiratory system makes acute adjustments in 1 to 12 minutes. Kidneys are the most powerful acid-base regulator but require many hours to several days to readjust the hydrogen ion concentration. In the process of adjusting the hydrogen ion concentration of the extracellular fluids, the kidneys excrete urine at a pH ranging from 4.5 to 8.0. The body forms 50 to 80 more milliosmoles of acid than alkali each day, and this acid must be removed continually. Because of the presence of this excess acid in the urine, normal urine pH averages about 6.0 as compared to 7.4, bloods pH^{3,4}.

Clinical abnormalities of acid-base are classified as respiratory acidosis, respiratory alkalosis, metabolic acidosis, and metabolic alkalosis. A person can cause respiratory acidosis by simply holding ones' breath! The lungs can not "blow off" the body's exhaust of carbon dioxide which increases the concentration of dissolved carbon dioxide in the blood and subsequently increases of carbonic acid and hydrogen ions. Respiratory acidosis frequently results from and/or causes pathological conditions (i.e., disease). On the other hand, only rarely do pathological conditions result from respiratory alkalosis^{3,4}.

Metabolic acidosis can result from the failure of the kidneys to excrete the metabolic acids normally formed in the body. Diarrhea, vomiting, uremia, and diabetes mellitus are specific conditions of metabolic acidosis. Metabolic alkalosis does not occur nearly as frequently as metabolic acidosis. Usually, metabolic alkalosis is a result of the administration of diuretics and excessive ingestion of alkaline drugs^{3,4}.

The three major buffer systems of the body are the bicarbonate, phosphate, and protein buffers. Each of the above-mentioned buffer systems could operate individually in the body fluids. However, the common thread between the buffer systems is the hydrogen ion, the "currency of acid-base balance" in the body. The important feature of this principle is that any condition that changes the balance of all the other buffer systems actually buffers each other by shifting hydrogen ions from one to the other¹².

Normal function of body cells depends on regulation of hydrogen ion (H⁺) concentration within very narrow limits. Normal serum pH is between 7.35-7.45. Cell function is seriously impaired when the pH falls out of these parameters. CO₂, produced by cells as an end product of aerobic carbohydrate metabolism, diffuses into the blood where it reacts with water to form carbonic acid. Carbonic acid may then dissociate, releasing free hydrogen ions (H⁺) into the blood resulting in a decrease in pH:



To counteract the continuous release of H⁺ ions, our bodies utilize buffer systems. Buffer systems consist of a weak acid (one that does not readily release free H⁺) with a salt of its conjugate base. The pH of a buffered solution tends to be fairly stable in spite of the addition of either acids or bases because the buffer systems combine with the added acids or bases to convert them to weaker forms. Buffer systems do not eliminate acid or base from the body, rather they minimize pH changes by forming acids or bases that do not readily dissociate into free ions. Because only free H⁺ ions contribute to pH, changes in pH are minimized.^{15,16}

Essentia Water has been fortified with bioavailable electrolytes, key to the function of these systems. **Essentia Water's** high pH or alkalinity, helps assist the body in maintaining proper pH balance by neutralizing acidic conditions in the body (See Figure 5). The same acidic conditions result from strenuous exercise, excess lactic acid resulting in lowered pH, and subsequently sore muscles.

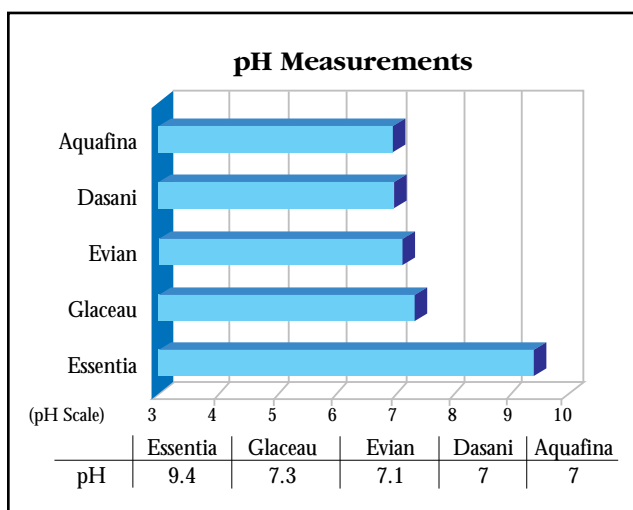


FIGURE 5. pH measurement of **Essentia Water** and other bottled water brands.

CONCLUSION

Essentia Water's state-of-the-art Ionic Separation technology produces the synergy of lower oxidation-reduction potential, physiological levels of conductivity, and high pH (alkalinity). In addition, the physical structure of Essentia Water, with smaller water clusters ("more saturating" water) secondary to fractionation enhances transport of nutrients across the cell membrane, promoting intracellular hydration.

Essentia Water is an extremely pure, non-source dependent water that exhibits unique physical and electrochemical properties enhanced with a proprietary bioavailable electrolyte formulation for cellular hydration.

Essentia Water is "Clearly . . . more than water" and has established the dawning of the science of "hydroceuticals™".

DEFINITIONS¹⁷

Anion (an'I-on) [Gr. ana up + ion going] an ion carrying a negative charge owing to a surplus of electrons.

Cation (kat'I-on) [Gr. kata down + ion going] an ion carrying a positive charge owing to a deficiency of electrons.

Dynes unit of force, CGS system

Electrolyte (e-lek'tro-lit) [electro + Gr. lytos that may be dissolved] a substance that dissolves into ions when fused or in solution, and thus becomes capable of conducting electricity: an ionic solute.

Extracellular outside a cell or cells.

pH (power of Hydrogen) the symbol relating the hydrogen ion concentration and activity of a solution to that of a standard solution. Numerically the pH is approximately equal to the negative logarithm of H⁺ concentration expressed in molarity. pH 7 is neutral; above it alkalinity increases and below it acidity increases.

Ion (I'on) [Gr. ion going] an atom or radical having a charge of positive (cation) or negative (anion) electricity owing to the loss (positive) or gain (negative) of one or more electrons.

Intracellular situated or occurring within a cell or cells.

Isotonic (i'so-ton'ik) [iso + Gr. topos tone] a biological term denoting a solution in which body cells can be bathed without a net flow of water across the semipermeable cell membrane. Also denoting a solution having the same tonicity as some other solution with which it is compared, such as the physiologic salt solution and the blood serum.

Osmolarity (oz'mo-lar'i-te) the concentration of osmotically active particles in solution expressed in terms of osmoles of solute per liter of solution.

Oxidation-Reduction Potential (ORP) is a measurement of the potential for a reaction to occur. Oxidation-reduction represents electron concentration and activity level. An ORP in the positive range indicates oxidation, (i.e., the absence of chemical potential energy, and an inability to perform additional chemical reactions).

An ORP in the negative range indicates chemical reduction, (i.e., the presence of electrons, potential energy, and the ability to generate additional chemical reactions).

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